

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-233958

(43)Date of publication of application : 13.09.1996

(51)Int.Cl.

G04D 7/00

G04C 3/00

G04G 1/00

H01M 2/10

H01M 16/00

(21)Application number : 07-039518

(71)Applicant : CITIZEN WATCH CO LTD

(22)Date of filing : 28.02.1995

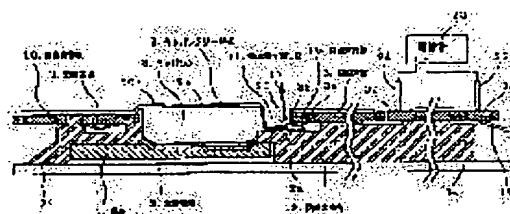
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(54) CONTACT STRUCTURE OF ELECTRONIC CLOCK

(57)Abstract:

PURPOSE: To enable the measurement of current consumption in a state wherein a cell and a capacitor are incorporated in a movement.

CONSTITUTION: A contact cutoff part 11 is formed by providing a hole, a notch or the like in a component above a contact spring part 9b of a capacitor lead plate 9 connecting a circuit board 3 and a capacitor 8 together. At the time when current consumption is measured, a contact of the capacitor lead plate 9 is cutoff by pushing the contact cutoff part 11 by a measuring jig and thereby the capacitor 8 is cutoff from a clock circuit. The operability of the measurement of current consumption is thereby improved and the retention of the capacitor can be ensured. This structure is effective especially for a solar cell clock which needs no replacement of a cell.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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**Japanese Patent Application,
Laid-Open Publication No. H08-233958**

INT. CL.⁶: G04D 7/04
G04C 3/00
G04G 1/00
H01M 2/10
16/00

PUBLICATION DATE: September 13, 1996

TITLE	CONTACT STRUCTURE OF ELECTRONIC CLOCK
APPLICATION NO.	H07-39518
FILING DATE	February 28, 1995
APPLICANT(S)	CITIZEN WATCH CO LTD
INVENTOR(S)	FUKUDA MASAMI KOBAYASHI ISAMU

[Claims]

[Claim 1] In the electronic clock which has the lead plate which connects the combination circuit which makes a clock drive, the power supply section which consists of capacitors in which drive energy is stored, such as a cell and a capacitor, and said combination circuit and said power supply section Said lead plate A connection with said combination circuit, or a connection with said power supply section, Contact structure of the electronic clock which has the pressure-welding contact spring section which has elasticity in either at least, and is characterized by constituting the contact separation section by the hole, notching, etc. in the component part by the side of the back lid of this pressure-welding contact spring section.

[Claim 2] Said power supply section is the contact structure of the electronic clock according to claim 1 characterized by being the capacitor which can be charged or rechargeable battery in which the charge generated with the solar battery is stored.

[Claim 3] Said lead plate is the contact structure of the electronic clock according to claim 1 which is the capacitor lead plate welded to the capacitor or rechargeable battery in which the charge which generated the contact of one of these with the solar battery is stored, and which can be charged.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the contact structure of an electronic clock.

[0002]

[Description of the Prior Art] The usual electronic clock is transmitting the output to the combination circuit with the connection spring of plus and minus, using the cell of a carbon button mold or a coin mold as an energy source. Moreover, a cell is held with the spacer made from plastics etc., and the structure which presses down the top-face side, covers with a plate etc., and is fixed with a screw is adopted. In this case, when shocked, risk of a cell jumping out of a movement and a stop and time amount deviation occurring could be prevented, but since a cell could not be taken out if the screw was removed and pressed down at the time of a changing battery and a plate was not removed, it was very inconvenient. Then, in order to make the activity of a changing battery easy to carry out, many things made into the structure where a cell can be easily removed where a movement is assembled have been adopted. For example, when holding

with the lateral pressure spring which presses down a cell from a side face and removing a cell, the structure which it is made to bend outside and takes out a lateral pressure spring is common. [0003] Moreover, a solar battery is used for a dial and the solar-battery clock which stores electricity the energy generated there at a cell and the capacitor in which the repeat charge and discharge of a similar configuration are possible is also produced commercially. In this case, since it is not necessary to exchange capacitors periodically like a cell, in order to ensure maintenance of a capacitor, there is much what was made into the structure where a capacitor cannot be easily removed in the state of a completion movement. Usually, the primary cell which cannot be charged is accidentally incorporated with a capacitor, and in order to prevent risk of a primary cell overcharging with a solar battery as a result, and exploding, there are some which are being made into the structure of being hard to remove a capacitor positively.

[0004]

[Problem(s) to be Solved by the Invention] However, if it is made the structure which cannot take out a cell easily in the state of a completion movement as mentioned above, the problem that measurement of the consumed electric current cannot be performed in the state of a completion movement will occur. Although it is common to carry out between the contacts of the plus and minus by connecting an ammeter with the power source used as instead of [of a cell] where a cell is removed in order to measure the consumed electric current of an electronic clock, with the structure where a cell cannot be removed, an ammeter is not connectable. Therefore, in order to measure the consumed electric current, after decomposing a movement once and removing a cell, it cannot but consider as the structure which assembles again or maintains electric connection also in the state of decomposition, and cannot but measure in the state of a half-completion movement. Anyway, since after measurement of the consumed electric current needs to assemble a movement again, an activity is serious. Moreover, it does not change to the attachment-and-detachment activity of a cell being needed at the time of measurement of the consumed electric current with the structure which can take out a cell in the state of a completion movement, either.

[0005] Measurement of the consumed electric current is one of the investigation items important when inspecting movements of an electronic clock, such as defect detection of the circumference of a wheel train, and a guarantee of a battery life, in the check of the contact of an electrical power system, or the electronic clock of an analog system. There are very many opportunities for measurement of the consumed electric current to be needed also in the failure analysis generated during real use besides the inspection at the time of shipment. Therefore, with the structure which cannot perform measurement of the consumed electric current if a clock is not disassembled, it will treat very much and will become a ***** product.

[0006] Moreover, in the solar-battery clock which the charge generated with the solar battery is stored [clock] in a capacitor, and makes a clock drive, it is the same as that of the usual battery-run clock, and if a capacitor cannot be removed from a completion movement, the consumed electric current cannot be measured easily. As mentioned above, since repeat charge and discharge are possible for the capacitor of a solar-battery clock and it is not necessary to exchange them periodically, it considers as the structure whose removal is simply impossible in many cases. Therefore, measurement of the consumed electric current serves as a difficult activity especially.

[0007] It is in the purpose of this invention offering the contact structure of the electronic clock which can measure the consumed electric current even if it solves the above-mentioned problem and does not remove capacitors, such as a cell and a capacitor.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is carrying out the following configurations. Namely, it sets to the electronic clock which has the lead plate which connects the combination circuit which makes a clock drive, the power supply section which consists of capacitors in which drive energy is stored, such as a cell and a capacitor, and said combination circuit and said power supply section. Said lead plate has the pressure-welding contact spring section of a connection with said combination circuit, or a connection with said

power supply section which has elasticity in either at least, and is characterized by constituting the contact separation section by the hole, notching, etc. in the component part by the side of the back lid of this pressure-welding contact spring section.

[0009]

[Example] Hereafter, the first example of this invention is explained in full detail based on a drawing. Drawing 1 is the important section sectional view of the solar-battery clock in which the first example of this invention is shown, and drawing 2 is the top view. Hereafter, the structure of the first example is explained in full detail by drawing 1 and drawing 2. Drawing 2 explains the plane configuration structure of this example first. 1 is a cope plate used as the base material of a movement. It is arranged so that the circuit susceptor 2 made from plastics may enclose a cope plate 1 in the top face of a cope plate 1, and the appearance of a movement is formed. The carbon button mold capacitor 8 grade which stores electricity the energy generated with the wheel train carrier 12 which holds each wheel train on the circuit susceptor 2, the completion coil 13, and the solar battery is arranged. The ring-like combination circuit 6 is arranged so that they may be surrounded, and the combination circuit 6 is pressed down by the metal circuit support plate 10 from the top face. Conclusion immobilization of the circuit support plate 10 is carried out with four hook 10b and screws 15. The combination circuit 6 mounts the electronic parts of the IC4 and the quartz-resonator 14 grade which drive a clock in the inferior-surface-of-tongue side of the circuit board 3. Moreover, plus pattern 3b takes about the inferior-surface-of-tongue side of the circuit board 3, and is pulling it out from the through hole hole to the top-face side in the plus inspection pattern 3d part. Moreover, the circuit support plate 10 has a peep hole into an inspection pattern 3d part, and it enables it to contact an inspection terminal from a top-face side to inspection pattern 3d in the state of a completion movement while it prevents short-circuit with inspection pattern 3d pulled out at the top-face side.

[0010] When a capacitor 8 is pressed down from a top-face side by HISASHI section 10a of the circuit support plate 10 and it is shocked, the capacitor 8 has prevented separating from a movement. Therefore, in the condition that the circuit support plate 10 was assembled, although a capacitor 8 is the structure which cannot be taken out, since the charge and discharge of the capacitor 8 are repeatedly carried out in response to the energy from a solar battery, periodical exchange does not have the need and it does not serve as trouble at all. Moreover, the resistance welding of the capacitor lead plate 9 with which a capacitor 8 transmits the output of plus to a top face is carried out by weld zone 9a. The pressure welding of the contact spring section 9b of the capacitor lead plate 9 was carried out to plus contact 3a of the circuit board 3, and it has taken the flow of plus of a capacitor 8 and a combination circuit 6. Moreover, with the capacitor receptacle spring 16, the minus side is performing the flow of a capacitor 8 and a combination circuit 6. Moreover, the contact separation section 11 which the appearance of the circuit board 3 and the circuit support plate 10 cut and lacked is formed in the contact spring section 9b part of the capacitor lead plate 9. 7 is a connection spring which transmits the output of the solar battery arranged to the dial side of a movement to a combination circuit 6.

[0011] Next, drawing 1 explains cross-section arrangement of this example. In drawing 1, the circuit susceptor 2 is arranged on the top face of a cope plate 1, and the circuit susceptor 2 holds the circuit board 3 and a capacitor 8. The circuit support plate 10 also holds the capacitor 8 from the top-face side by HISASHI section 10a which performed stage bending while pressing down the circuit board 3 from a top-face side. Moreover, the capacitor lead plate 9 is welded to the capacitor 8. Bottom bending of the contact spring section 9b of the capacitor lead plate 9 is carried out on the outside of a capacitor 8, it carries out a pressure welding to plus contact 3a from the inferior-surface-of-tongue side of the circuit board 3, and is making it flow through the plus output of a capacitor 8 to the circuit board 3. Therefore, even if it mistakes for a capacitor 8 and the primary cell of the carbon button mold of a similar configuration is incorporated at the time of the repair and the overhaul procedure in a commercial scene, since the capacitor lead plate 9 is not attached, a cell and the circuit board 3 do not flow but a cell can prevent risk of overcharging and exploding. Moreover, plus inspection pattern 3d is pulled out through the through hole at the top-face side from plus contact 3a of the circuit board 3. The capacitor

receptacle spring 16 which has flowed the minus side of a capacitor 8 on the other hand carries out a pressure welding to minus contact 3c, and is pulling out the minus terminal to minus inspection pattern 3e by the side of a top face. Between a capacitor 8 and plus contact 3a, the contact separation section 11 which cut and lacked the appearance of the circuit board 3 and the circuit support plate 10 is formed. 5 is a solar battery arranged instead of a dial, and 7 is a connection spring which transmits the output of a solar battery 5 to the circuit board 3.

[0012] The measuring method of the consumed electric current is explained in the above configurations. In drawing 1, contact spring section 9b of the capacitor lead plate 9 is pushed in the direction of an arrow head 17 with the depression terminal 26 from the contact separation section 11. Then, contact spring section 9b is depressed below, as a broken line shows, and it is separated from plus contact 3a of the circuit board 3. Therefore, the plus side of a capacitor 8 will be in the condition of having been separated from the clock circuit. Each connects to plus inspection pattern 3d of the circuit board 3, and minus inspection pattern 3e the plus contact terminal 24 and the minus contact terminal 25 of an ammeter 23 with another power source which serves as instead of [of a capacitor 8] in this condition, and the consumed electric current is measured. That is, if an object with 3 of the depression terminal 26, the plus contact terminal 24, and the minus contact terminal 25 terminals is prepared as a fixture of the consumed electric current, measurement of the consumed electric current can be performed easily. Since the capacitor lead plate 9 is welded to a capacitor 8 and the capacitor lead plate 9 has contact spring section 9b with the circuit board 3 in order to prevent the burst by the incorrect assembly of a cell as mentioned above, it is effective to use the contact spring section 9b for the separation at the time of consumed-electric-current measurement. In addition, when contact spring section 9b is depressed, it depressed to the circuit susceptor 2 and receptacle side 2a at the time is provided so that a spring may be depressed too much and may not be deformed plastically.

[0013] Moreover, plus pattern 3b of the circuit board 3 is formed in the inferior-surface-of-tongue side of the circuit board 3 as mentioned above except plus inspection pattern 3d. By letting plus pattern 3b pass to the inferior-surface-of-tongue side where the circuit susceptor 2 made from plastics has been arranged, this is for preventing that plus pattern 3b short-circuits with the plus can of a capacitor 8, and the circuit support plate 10 grade through which it has flowed. Since the plus side is used as the reference electrode in the usual electronic clock, even if plus pattern 3b short-circuits with the conductive member of the plus can of a capacitor 8, or others, it is satisfactory, but since it is necessary to separate plus of a capacitor 8 from a clock circuit in this example at the time of measurement of the consumed electric current, except plus contact 3a, the flow of plus cannot be taken and must be carried out. Therefore, it is better to make it small as much as possible, in order that plus pattern 3b may prevent short-circuit with a conductive component part. What is necessary is just to use a float pattern without not plus pattern 3b but IC4, and connection to take a large pattern for reinforcement of the circuit board 3, or protection from light of IC4.

[0014] Although this example explained the solar-battery clock, it is possible to adopt this structure also about the electronic clock which uses primary cells, such as silver and alkali, as a power source. That is, since measurement of the consumed electric current can be performed in the state of the completion movement incorporating a cell, since the dependability of a movement is increased, a cell can be certainly held inside a movement, and the elutriation of the cell in an impact etc. can be prevented. Moreover, since the consumed electric current can be measured as it is, without removing a cell even if it is the structure which can take out a cell from a completion movement condition easily, measurement of the consumed electric current becomes easy.

[0015] Next, the second example of this invention is explained based on a drawing. Drawing 3 is the important section sectional view showing the second example of this invention. In drawing 3, on the cope plate 1, the circuit susceptor 2 made from plastics is arranged, it is positioned by two boss 2bs of the circuit susceptor 2, and the capacitor receptacle spring 16 is incorporated. The top-face side of the capacitor receptacle spring 16 is pressed down with the spacer 18 made from plastics. Moreover, contact spring section 16a of the capacitor receptacle spring 16 carried out

the pressure welding to the minus can of a capacitor 8, the pressure welding of another contact was carried out to minus contact 3c of the circuit board 3, and it has taken the flow of minus. 3d is the plus inspection pattern which flowed the plus side of a capacitor 8. Moreover, the circuit support plate 10 is pressing down the circuit board 3, the spacer 18, and the capacitor 8 from the top face. The contact separation section 21 which removed the meat of the circuit support plate 10 or a spacer 18 is formed in the side face of a capacitor 8.

[0016] In order to measure the consumed electric current, the capacitor receptacle spring 16 is first depressed in the direction of an arrow head 19 with the minus contact terminal 25 of an ammeter 23 from the contact separation section 21. At this time, contact spring section 16a of the capacitor receptacle spring 16 separates from the minus can of a capacitor 8, as a broken line shows, and a capacitor 8 is separated from a clock circuit. Moreover, the minus contact terminal 25 has flowed with the minus pattern of the circuit board 3 through the capacitor receptacle spring 16. Therefore, depressing the capacitor receptacle spring 16 with the minus contact terminal 25 of an ammeter 23, if the plus contact terminal 24 is connected to plus inspection pattern 3d of the circuit board 3, the consumed electric current can be measured. That is, although the fixture of the consumed electric current needed 3 of the depression terminal 26, the plus contact terminal 24, and the minus contact terminal 25 terminals in the first above-mentioned example since the contact by the side of the circuit board 3 was separated in order to separate a capacitor 8 from a clock circuit. If the contact by the side of a capacitor 8 is separated like the second example, since separation of a contact can be performed using the minus contact terminal 25, it depresses, and especially the terminal 26 is unnecessary and should prepare only two terminals.

[0017] however -- since the capacitor receptacle spring 16 located near the inferior surface of tongue of a capacitor 8 must be pushed in order to separate a contact with a capacitor 8 -- a movement -- it becomes a separation activity in back one comparatively, and separation of a contact is expected to be a little difficult. Moreover, since the pressure welding of it is carried out by the comparatively high force in order that the contact spring force of the capacitor receptacle spring 16 may avoid the defective continuity under the variation in the thickness of a capacitor 8, or the effect of surface electrical resistance, the force strong also against separation of a contact is needed, and its workability of separation of a contact is bad also in the field. Moreover, since the contact separation section 21 is formed in the side face of a capacitor 8, and it is necessary to turn off and lack a spacer 18 and the circuit support plate 10, a possibility that maintenance of a capacitor 8 may become unstable will also be generated.

[0018] As the cure, drawing 4 explains the third example. Drawing 4 is the important section sectional view showing the third example of this invention. In drawing 4, laminating immobilization of a cope plate 1, the circuit susceptor 2, the circuit board 3, a spacer 18, and the circuit support plate 10 is carried out like drawing 3, and the capacitor 8 is incorporated between them. The pressure welding of the end of the capacitor receptacle spring 16 is carried out to the minus can of a capacitor 8, and it takes a flow, and upper bending of the point is carried out, and it is positioned by boss 2d of circuit susceptor. 20 is a negative lead plate with conductivity, and is positioned by boss 2c of circuit susceptor. The negative lead plate 20 has taken the flow of the capacitor receptacle spring 16 and the circuit board 3 by contact spring section 20a with the capacitor receptacle spring 16, and contact spring section 20b with the circuit board 3. A hole can open in the spacer 18 and the circuit support plate 10 of the contact spring section 20a upper part of the negative lead plate 20, respectively, and the contact separation section 22 is constituted.

[0019] In order to measure the consumed electric current with the above configuration, contact spring section 20a of the negative lead plate 20 is depressed in the direction of an arrow head 27 from the contact separation section 22 with the minus contact terminal 25 of an ammeter. Then, the flow of contact spring section 20a and the capacitor lead plate 16 is separated, and a capacitor 8 is separated from a clock circuit. And although not illustrated, if the plus terminal of an ammeter is connected to the plus pattern of the circuit board 3, the consumed electric current can be measured.

[0020] In the third example, by making the negative lead plate 20 which is another member intervene between [one more] the circuit board 3 and the capacitor receptacle spring 16 as

mentioned above The contact separation section 22 can prepare in the location where a movement is shallower than the inferior surface of tongue of a capacitor 8, and comes. Moreover, since it can carry out by the force weaker than the force which separates the contact of a capacitor 8 like the second example, and the capacitor receptacle spring 16, the workability of separation force of a contact of contact separation improves. Moreover, in the second example, although it had to prepare near the capacitor 8, the contact separation section 21 can form the contact separation section 22 in a free location according to the configuration, if the negative lead plate 20 is used. Therefore, since notching of the contact separation section 21 like drawing 3 does not have the need, maintenance of a capacitor 8 can also be ensured. Moreover, since the contact separation section 22 is made into the round hole configuration in the third example, the location of a separation terminal is improvement[in workability nearby]-made easy to guide.

[0021]

[Effect of the Invention] According to this invention, the cell and capacitor in which the drive energy of an electronic clock is stored can measure the consumed electric current as mentioned above with the condition of having been included in the movement. Therefore, since it is not necessary like the conventional clock to remove a capacitor etc. specially when measuring the consumed electric current, it is easy to perform measurement. Moreover, since the failure analysis since inspection of the consumed electric current at the time of an assembly was also conducted in the culmination of an assembly, after being able to check the shipment guarantee of a final movement and shipping goods can also check the consumed electric current with a completion movement, it is easy to perform the elucidation of the cause of a defect. And this structure can be adopted, a cell and a capacitor can be arranged inside a movement, and the blank from the movement of the cell by the structure which closed the top-face side of a movement with the circuit support plate etc., then the impact from which a problem tends [comparatively] to arise can be prevented. Therefore, this invention is effective in especially a clock without the need for a periodical changing battery, i.e., the electronic clock which stores electricity a solar battery and other generation-of-electrical-energy energy at a capacitor, and drives a clock.

[Brief Description of Drawings]

[Drawing 1] It is the important section sectional view showing the 1st example of this invention.

[Drawing 2] It is the assembly top view showing the 1st example of this invention.

[Drawing 3] It is the important section sectional view showing the 2nd example of this invention.

[Drawing 4] It is the important section sectional view showing the 3rd example of this invention.

[Description of Reference Numbers]

- 1 Cope Plate
- 2 Circuit Susceptor
- 3 Circuit Board
- 5 Solar Battery
- 6 Combination Circuit
- 8 Capacitor
- 9 Capacitor Lead Plate
- 10 Circuit Support Plate
- 11 21 22 Contact Separation Section
- 16 Capacitor Receptacle Spring
- 20 Negative Lead Plate

特開平8-233958

(43) 公開日 平成8年(1996)9月13日

(51) Int.Cl. ⁶	識別記号	庁内整理番号	F I	技術表示箇所
G 0 4 D 7/00			G 0 4 D 7/00	Z
G 0 4 C 3/00			G 0 4 C 3/00	H
G 0 4 G 1/00	3 1 0	9109-2F	G 0 4 G 1/00	3 1 0 E
H 0 1 M 2/10			H 0 1 M 2/10	Q
16/00			16/00	
審査請求 未請求 請求項の数 3 O L (全 6 頁)				

(21) 出願番号 特願平7-39518

(22) 出願日 平成7年(1995)2月28日

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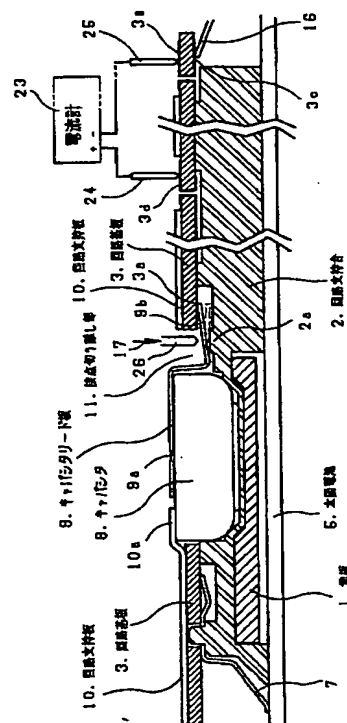
(54) 【発明の名称】 電子時計の接点構造

(57) 【要約】

【目的】 本発明は、電池やキャパシタをムーブメントに組み込んだ状態のまま、消費電流の測定を行なう事が出来る。

【構成】 回路基板3とキャパシタ8を接続するキャパシタリード板9の、接点バネ部9bの上方の構成部品に穴や切り欠き等を設けて、接点切り離し部11を形成する。消費電流の測定時は、その接点切り離し部11を測定治具で押してキャパシタリード板9の接点を切り離し、時計回路からキャパシタ8を切り離す。

【効果】 消費電流の測定作業性が良くなり、またキャパシタの保持を確実にする事ができる。電池交換の必要が無い太陽電池時計には、特に有効である。



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【特許請求の範囲】

【請求項1】 時計を駆動させる複合回路と、駆動エネルギーを蓄える電池やキャパシタ等の蓄電器より成る電源部と、前記複合回路と前記電源部を接続するリード板を有する電子時計において、前記リード板は、前記複合回路との接続部あるいは前記電源部との接続部の、少なくともどちらか一方に弾性を有する圧接接点バネ部を有し、該圧接接点バネ部の裏蓋側の構成部品に、穴や切り欠き等による接点切り離し部を構成した事の特徴とする電子時計の接点構造。

【請求項2】 前記電源部は、太陽電池により発生した電荷を蓄える充電可能なキャパシタまたは二次電池である事の特徴とする請求項1記載の電子時計の接点構造。

【請求項3】 前記リード板は、その一方の接点を、太陽電池により発生した電荷を蓄える充電可能なキャパシタまたは二次電池に溶接したキャパシタリード板である請求項1記載の電子時計の接点構造。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、電子時計の接点構造に関する。

【0002】

【従来の技術】通常の電子時計は、エネルギー源としてボタン型やコイン型の電池を用い、その出力をプラスとマイナスの接続バネにより複合回路へ伝達している。また電池はプラスチック製のスペーサ等で保持し、その上面側を押さえ板等で覆ってネジにより固定する構造が採用されている。この場合、衝撃を受けた時等に電池がムーブメントから飛び出して、止まりや時間狂いが発生してしまう危険を防止する事ができるが、電池交換時にはネジを外して押さえ板を取り除かなければ電池が取りだせないで非常に不便であった。その後、電池交換の作業をしやすくするために、ムーブメントが組み立てられた状態で電池を容易に取り外せる構造としているものが多く採用されてきている。例えば電池を側面から押さえる側圧バネにより保持し、電池を取り外す時は側圧バネを外側にたわませて取り出す構造等が一般的である。

【0003】また、文字板に太陽電池を用い、そこで発生したエネルギーを電池と類似形状の繰り返し充放電が可能なキャパシタに蓄電する太陽電池時計も製品化されている。この場合、キャパシタは電池の様に定期的に交換する必要がないので、キャパシタの保持を確実にするため、完成ムーブメント状態では簡単にキャパシタを取り外せない構造としたものが多い。通常充電不能な一次電池がキャパシタと誤って組み込まれ、その結果太陽電池により一次電池が過充電されて破裂してしまう危険を防止するため、積極的にキャパシタを取り外し難い構造としているものもある。

【0004】

【発明が解決しようとする課題】しかし、前述の様に完

成ムーブメント状態では電池を簡単には取り出せない構造にすると、完成ムーブメント状態では消費電流の測定が出来ないという問題が発生する。電子時計の消費電流を測定するためには、電池を取り外した状態でそのプラスとマイナスの接点間に電池の代わりとなる電源を有した電流計を接続して行なうのが一般的であるが、電池が取り外せない構造では電流計を接続する事が出来ない。そのため消費電流を測定するには、一度ムーブメントを分解して電池を取り外してから再び組み立てるか、分解状態でも電気的な接続を保つ構造とし、半完成ムーブメントの状態にて測定するしかない。いずれにしても消費電流の測定後は再びムーブメントを組み立てる必要があるため、作業が大変である。また完成ムーブメント状態で電池が取り出せる構造でも、消費電流の測定時に電池の着脱作業が必要になる事にはかわらない。

【0005】消費電流の測定は、電源系の接点の確認やアナログ系の電子時計では輪列回りの不良検出、また電池寿命の保証等、電子時計のムーブメントを検査する上で重要な調査項目の一つである。出荷時の検査の他、実使用中に発生した不良解析等においても消費電流の測定が必要となる機会は非常に多い。そのため、時計を分解しなければ消費電流の測定ができない構造では、非常に扱いづらい製品となってしまう。

【0006】また太陽電池で発生した電荷をキャパシタに蓄えて時計を駆動させる太陽電池時計においても、通常の電池時計と同様であり、キャパシタを完成ムーブメントから取り外す事が出来なければ、簡単に消費電流を測定する事が出来ない。前述の様に、太陽電池時計のキャパシタは繰り返し充放電が可能なため定期的に交換する必要がないので、簡単に取り外しが出来ない構造とする事が多い。よって、消費電流の測定は、特に難しい作業となっている。

【0007】本発明の目的は上記問題を解決し、電池やキャパシタ等の蓄電器を取り外さなくとも消費電流が測定できる電子時計の接点構造を提供することにある。

【0008】

【課題を解決するための手段】上記の目的を達成するために、本発明は次のような構成をしている。即ち、時計を駆動させる複合回路と、駆動エネルギーを蓄える電池やキャパシタ等の蓄電器より成る電源部と、前記複合回路と前記電源部を接続するリード板を有する電子時計において、前記リード板は、前記複合回路との接続部あるいは前記電源部との接続部の、少なくともどちらか一方に弾性を有する圧接接点バネ部を有し、該圧接接点バネ部の裏蓋側の構成部品に、穴や切り欠き等による接点切り離し部を構成した事の特徴としている。

【0009】

【実施例】以下、本発明の第一実施例を図面に基づいて詳述する。図1は本発明の第一実施例を示す太陽電池時計の要部断面図であり、図2はその平面図である。以

下、図1及び図2により、第一実施例の構造を詳述する。まず図2により本実施例の平面配置構造を説明する。1はムーブメントの基材となる地板である。地板1の上面にはプラスチック製の回路支持台2が地板1を取り囲む様に配置され、ムーブメントの外形を形成している。回路支持台2の上に、各輪列を保持する輪列受12、完成コイル13、太陽電池で発生したエネルギーを蓄電するボタン型キャパシタ8等が配置されている。それらを取り囲む様にリング状の複合回路6が配置され、複合回路6は上面から金属製の回路支持板10により押さえられている。回路支持板10は4箇所のフック10b、及びネジ15により締結固定されている。複合回路6は、回路基板3の下面側に、時計を駆動するIC4や水晶振動子14等の電子部品を実装している。また、プラスパターン3bは、回路基板3の下面側を引き回し、プラス検査パターン3dの部分にてスルーホール穴から上面側に引き出している。また、回路支持板10は検査パターン3d部分にノゾキ穴を有し、上面側に引き出された検査パターン3dとのショートを防止すると共に、完成ムーブメント状態で上面側から検査パターン3dへ検査端子が当接できる様にしている。

【0010】キャパシタ8は回路支持板10のヒサシ部10aで上面側から押さえられ、衝撃を受けた時等にキャパシタ8がムーブメントから外れてしまうのを防止している。よって、回路支持板10が組み立てられた状態においては、キャパシタ8は取り出せない構造であるが、キャパシタ8は太陽電池からのエネルギーを受けて繰り返し充放電されるので定期的交換は必要無く、何等支障とはならない。またキャパシタ8は、上面にプラスの出力を伝達するキャパシタリード板9が溶接部9aで抵抗溶接されている。キャパシタリード板9の接点バネ部9bは回路基板3のプラス接点3aに圧接してキャパシタ8と複合回路6のプラスの導通をとっている。またマイナス側はキャパシタ受けバネ16により、キャパシタ8と複合回路6の導通を行なっている。また、キャパシタリード板9の接点バネ部9b部分には、回路基板3と回路支持板10の外形が切り欠かれた接点切り離し部11を設けている。7は、ムーブメントの文字板側に配置した太陽電池の出力を複合回路6へ伝達する接続バネである。

【0011】次に、図1により本実施例の断面配置を説明する。図1において、地板1の上面に回路支持台2を配置し、回路支持台2は回路基板3や、キャパシタ8を保持している。回路支持板10は回路基板3を上面側から押さえると共に、段曲げを行なったヒサシ部10aによってキャパシタ8も上面側から保持している。またキャパシタ8にはキャパシタリード板9が溶接されている。キャパシタリード板9の接点バネ部9bはキャパシタ8の外側で下曲げ加工され、回路基板3の下面側からプラス接点3aに圧接させ、キャパシタ8のプラス出力

を回路基板3へ導通させている。よって市場での修理やオーバーホール時にキャパシタ8と間違えて類似形状のボタン型の一次電池が組み込まれても、キャパシタリード板9が付いていないので電池と回路基板3は導通されず、電池が過充電されて破裂する危険を防止する事ができる。また回路基板3のプラス接点3aからスルーホールを通して上面側にプラス検査パターン3dが引き出されている。一方キャパシタ8のマイナス側と導通しているキャパシタ受けバネ16がマイナス接点3cに圧接して、上面側のマイナス検査パターン3eまでマイナス端子を引き出している。キャパシタ8とプラス接点3aの間には、回路基板3と回路支持板10の外形を切り欠いた接点切り離し部11が形成されている。5は文字板の代わりに配置した太陽電池であり、7は太陽電池5の出力を回路基板3に伝達する接続バネである。

【0012】以上のような構成において、消費電流の測定方法を説明する。図1において、接点切り離し部11から、押し下げ端子26によりキャパシタリード板9の接点バネ部9bを矢印17の方向へ押す。その時接点バネ部9bは破線で示す様に下方へ押し下げられ、回路基板3のプラス接点3aと切り離される。よってキャパシタ8のプラス側は時計回路から切り離された状態となる。この状態にてキャパシタ8の替わりとなる別電源を有した電流計23のプラス接点端子24とマイナス接点端子25を、回路基板3のプラス検査パターン3dとマイナス検査パターン3eにそれぞれの接続して消費電流を測定する。つまり、消費電流の測定治具としては、押し下げ端子26、プラス接点端子24、及びマイナス接点端子25の3端子を有した物を用意すれば、消費電流の測定は簡単に行なえる。前述の様に電池の誤組立てによる破裂を防止するために、キャパシタ8にキャパシタリード板9が溶接され、また、キャパシタリード板9は回路基板3との接点バネ部9bを有しているため、その接点バネ部9bを消費電流測定時の切り離しに利用するのが有効である。尚、接点バネ部9bを押し下げた時に、バネを押し下げ過ぎて塑性変形しないように、回路支持台2には押し下げ時の受け面2aを設けている。

【0013】また回路基板3のプラスパターン3bは前述のように、プラス検査パターン3d以外は回路基板3の下面側に形成している。これはプラスチック製の回路支持台2が配置された下面側にプラスパターン3bを通す事により、プラスパターン3bがキャパシタ8のプラス缶と導通している回路支持板10等とショートするのを防止するためである。通常の電子時計ではプラス側を基準電極としているため、プラスパターン3bはキャパシタ8のプラス缶やその他の導電部材とショートしても問題ないが、本実施例では消費電流の測定時にキャパシタ8のプラスを時計回路から切り離す必要があるため、プラス接点3a以外ではプラスの導通を取れなくしなければならない。よって、プラスパターン3bは導電性の

構成部品とのショートを防止するため極力小さくしたほうが良い。回路基板3の補強やIC4の遮光のためにパターンを大きく取りたい時は、プラスパターン3bではなくIC4と接続のない浮きパターンを用いれば良い。

【0014】本実施例は太陽電池時計について説明したが、銀やアルカリ等の一次電池を電源とする電子時計についてもこの構造を採用する事は可能である。すなわち、電池を組み込んだ完成ムーブメント状態で消費電流の測定ができるので、ムーブメントの信頼性を増すために電池をムーブメントの内部で確実に保持して、衝撃での電池の飛び出し等を防止する事ができる。また、完成ムーブメント状態から簡単に電池を取りだせる構造であっても、電池を取り外さずにそのまま消費電流を測定する事ができるので、消費電流の測定作業が簡単になる。

【0015】次に本発明の第二実施例を図面に基づいて説明する。図3は本発明の第二実施例を示す要部断面図である。図3において、地板1の上にプラスチック製の回路支持台2が配置され、回路支持台2の2本のボス2bに位置決めされてキャパシタ受けバネ16が組み込まれている。キャパシタ受けバネ16の上面側はプラスチック製のスペーサ18で押さえられている。またキャパシタ受けバネ16の接点バネ部16aは、キャパシタ8のマイナス缶と圧接し、もう一方の接点は回路基板3のマイナス接点3cと圧接してマイナスの導通を取っている。3dはキャパシタ8のプラス側と導通したプラス検査パターンである。また回路支持板10は回路基板3、スペーサ18、及びキャパシタ8を上から押さえている。キャパシタ8の側面には、回路支持板10やスペーサ18の肉を取り除いた接点切り離し部21が形成されている。

【0016】消費電流を測定するには、まず接点切り離し部21から電流計23のマイナス接点端子25で矢印19の方向へキャパシタ受けバネ16を押し下げる。この時、キャパシタ受けバネ16の接点バネ部16aは破線で示すようにキャパシタ8のマイナス缶から離れ、キャパシタ8は時計回路から切り離される。また、マイナス接点端子25はキャパシタ受けバネ16を介して回路基板3のマイナスパターンと導通している。よって電流計23のマイナス接点端子25でキャパシタ受けバネ16を押し下げながら、プラス接点端子24を回路基板3のプラス検査パターン3dに接続すれば消費電流を測定する事が出来る。つまりキャパシタ8を時計回路から切り離すために、前述の第一実施例では回路基板3側の接点を切り離したため、消費電流の測定治具は、押し下げ端子26、プラス接点端子24、及びマイナス接点端子25の3端子を必要としたが、第二実施例の様にキャパシタ8側の接点を切り離せば、接点の切り離しをマイナス接点端子25を利用して行なう事ができるので押し下げ端子26は特に必要なく、2端子のみを用意すれば良い。

【0017】しかし、キャパシタ8との接点を切り離すためには、キャパシタ8の下面付近に位置するキャパシタ受けバネ16を押さなければならないので、ムーブメントの比較的奥の方での切り離し作業となり、接点の切り離しがやや困難であると予想される。またキャパシタ受けバネ16の接点バネ力は、キャパシタ8の厚さのバラツキや表面抵抗の影響による導通不良を避けるため、比較的高い力で圧接しているため、接点の切り離しにも強い力が必要となり、その面でも接点の切り離しの作業性が悪い。また、キャパシタ8の側面に接点切り離し部21を設けているために、スペーサ18や、回路支持板10を切り欠く必要があるので、キャパシタ8の保持が不安定になる恐れも発生してしまう。

【0018】その対策として、図4により第三実施例を説明する。図4は本発明の第三実施例を示す要部断面図である。図4において、図3と同様に地板1、回路支持台2、回路基板3、スペーサ18、回路支持板10が積層固定され、その間にキャパシタ8が組み込まれている。キャパシタ受けバネ16の一端はキャパシタ8のマイナス缶に圧接して導通を取り、その先が上曲げされて回路支持台のボス2dで位置決めされている。20は導電性を有したマイナスリード板であり、回路支持台のボス2cで位置決めされている。マイナスリード板20は、キャパシタ受けバネ16との接点バネ部20aと、回路基板3との接点バネ部20bにより、キャパシタ受けバネ16と回路基板3の導通を取っている。マイナスリード板20の接点バネ部20a上方の、スペーサ18、及び回路支持板10にそれぞれ穴が開けられ、接点切り離し部22を構成している。

【0019】以上の構成で消費電流を測定するには、電流計のマイナス接点端子25により、接点切り離し部22からマイナスリード板20の接点バネ部20aを、矢印27の方向へ押し下げる。その時、接点バネ部20aとキャパシタリード板16の導通は切り離され、キャパシタ8は時計回路から切り離される。そして、図示していないが電流計のプラス端子を回路基板3のプラスパターンへ接続すれば、消費電流を測定する事ができる。

【0020】以上の様に第三実施例においては、回路基板3とキャパシタ受けバネ16の間にもう一つ別の部材であるマイナスリード板20を介在させることにより、接点切り離し部22がキャパシタ8の下面よりも、ムーブメントの浅い位置に設ける事が出来き、また接点の切り離し力も、第二実施例の様なキャパシタ8とキャパシタ受けバネ16の接点を切り離す力より弱い力で行なえるので、接点切り離しの作業性が向上する。また第二実施例では接点切り離し部21はキャパシタ8の近傍に設けなければならなかったが、マイナスリード板20を用いれば、その形状に応じて自由な位置に接点切り離し部22を設ける事ができる。そのため図3の様な接点切り離し部21の切り欠きが必要無いので、キャパシタ8

8

的な電池交換の必要が無い時計、つまり太陽電池やその他の発電エネルギーをキャパシタに蓄電して時計を駆動する電子時計には、特に有効である。

【図面の簡単な説明】

【図 4】本発明の第 3 実施例を示す要部断面図である。

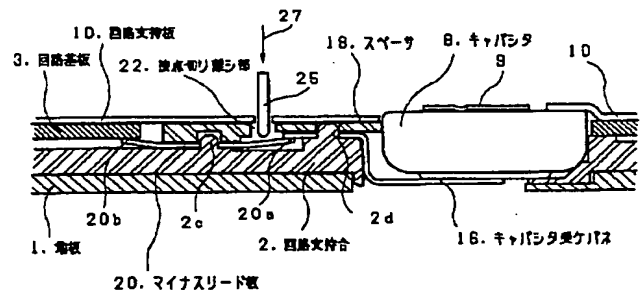
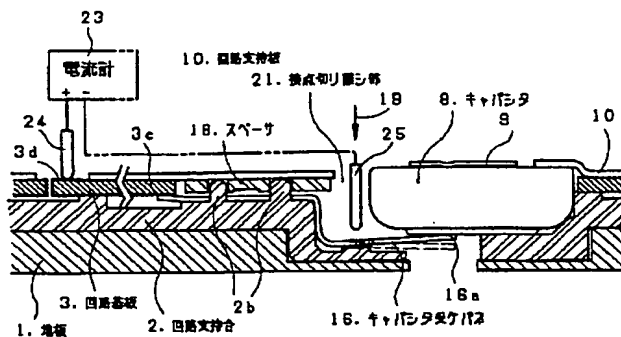
10

- | | |
|----|---------------|
| 1 | 地板 |
| 2 | 回路支持台 |
| 3 | 回路基板 |
| 5 | 太陽電池 |
| 6 | 複合回路 |
| 8 | キャパシタ |
| 9 | キャパシタリード板 |
| 10 | 回路支持板 |
| 11 | 21 22 接点切り離し部 |
| 16 | キャパシタ受けバネ |
| 20 | マイナスリード板 |

10. 回路支持板
3. 回路基板
10a
9a
11. 接点切り離し部
10. 回路支持板
3. 回路基板
3a
3d
24
25
3e
16
7
1. 基板
5. 大電池
2. 回路支持台
2a
2b
2c
2d
2e
2f
2g
2h
2i
2j
2k
2l
2m
2n
2o
2p
2q
2r
2s
2t
2u
2v
2w
2x
2y
2z

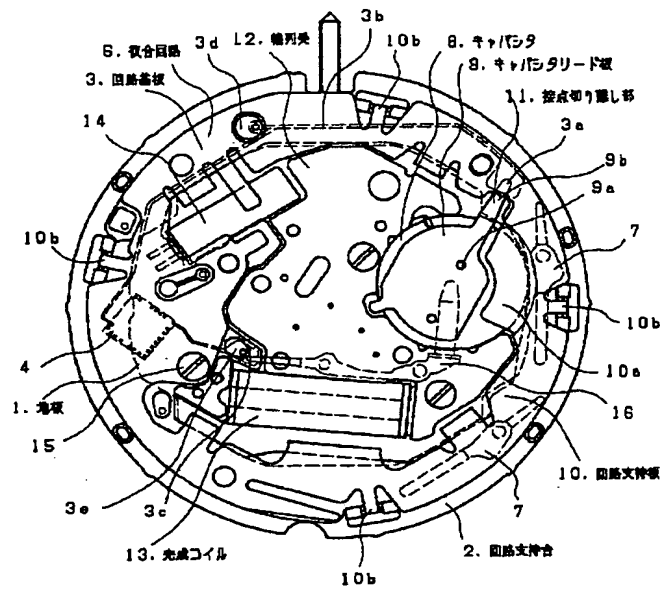
電流計
+

【図 4】



-5-

【図 2】



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